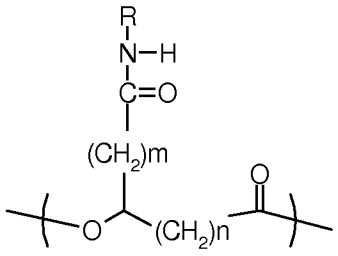
B. Claims

The following is a complete listing of the claims, and replaces all earlier versions and listings.

1. (Currently Amended) ~~Polyhydroxyalkanoate comprised of~~A polyhydroxyalkanoate comprising at least a unit represented by a chemical formula (1) within ~~the~~ its molecule:

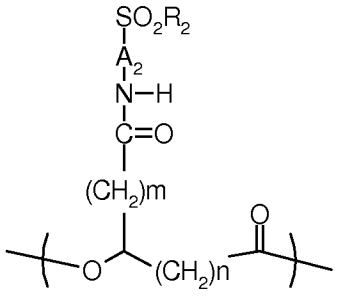


(1),

wherein R represents $-A_1-SO_2R_1$; R_1 represents OH, a halogen atom, ONa, OK or OR_{1a}; R_{1a} and A_1 each independently represents a group having a substituted or unsubstituted aliphatic hydrocarbon structure, a substituted or unsubstituted aromatic ring structure or a substituted or unsubstituted heterocyclic structure; n represents an integer selected from 0 to 4; m represents an integer selected from 0 - 8 in case n is 0, 2, 3 or 4, and m represents 0 in case n is 1; and ~~in case plural units are~~if more than one unit of the chemical formula (1) is present, each of R, R_1, R_{1a}, A_1, m, and n ~~have the aforementioned meanings~~is independently selected for each unit.

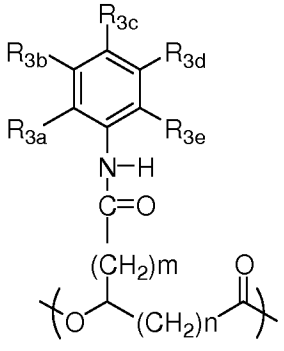
2. (Withdrawn-Currently Amended) ~~Polyhydroxyalkanoate~~ The polyhydroxyalkanoate according to claim 1, comprised of, as the unit represented by the

chemical formula (1), at least a unit represented by a chemical formula (2), a chemical formula (3), a chemical formula (4A) or (4B), within the molecule:



(2),

wherein R_2 represents OH, a halogen atom, ONa, OK or OR_{2a}; R_{2a} represents a linear or branched alkyl group with 1 to 8 carbon atoms or a substituted or unsubstituted phenyl group, A_2 represents a linear or branched alkylene group with 1 to 8 carbon atoms; n represents an integer selected from 0 to 4; m represents an integer selected from 0 - 8 in case n is 0, 2, 3 or 4, and m represents 0 in case n is 1; and ~~in case plural units are~~if more than one unit of the chemical formula (2) is present, each of A_2, R_2, R_{2a}, m, and n ~~have the aforementioned meanings~~is independently selected for each unit;



(3),

wherein each of R_{3a}, R_{3b}, R_{3c}, R_{3d} and R_{3e} ~~each~~ independently represents SO_2R_{3f} ~~(R_{3f} representing OH, a halogen atom, ONa, OK or OR_{3f1} (R_{3f1} representing a linear~~

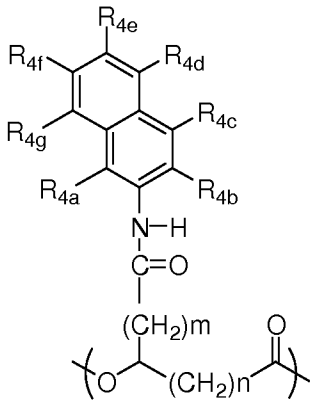
~~or branched alkyl group with 1 to 8 carbon atoms or a substituted or unsubstituted phenyl group))~~, a hydrogen atom, a halogen atom, an alkyl group with 1 - 20 carbon atoms, an alkoxy group with 1 - 20 carbon atoms, an OH group, an NH_2 group, an NO_2 group, $COOR_{3g}$ ~~(R_{3g} representing a H atom, a Na atom or a K atom)~~, an acetamide group, an OPh group, ~~a~~ an NHPh group, a CF_3 group, a C_2F_5 group, or a C_3F_7 group ~~(Ph indicating a phenyl group)~~, of which at least one is SO_2R_{3f}; n represents an integer selected from 0 to 4; m represents an integer selected from 0 - 8 in case n is 0, 2, 3 or 4, and m represents 0 in case n is 1; and ~~in case plural units are~~ if more than one unit of the chemical formula (3) is present, each of R_{3a}, R_{3b}, R_{3c}, R_{3d}, R_{3e}, R_{3f}, R_{3f1}, R_{3g}, m, and n ~~have the aforementioned meanings~~ is independently selected for each unit,

where R_{3f} is OH, a halogen atom, ONa, OK, or OR_{3f1};

R_{3f1} is a linear or branched alkyl group with 1 to 8 carbon atoms or a substituted or unsubstituted phenyl group;

R_{3g} is H, Na, or K; and

Ph is a phenyl group;



(4A),

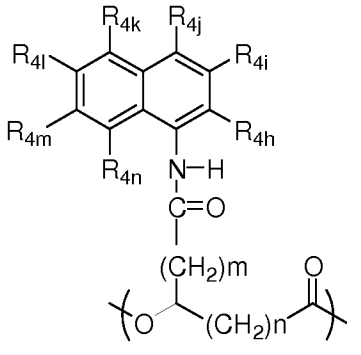
wherein each of R_{4a}, R_{4b}, R_{4c}, R_{4d}, R_{4e}, R_{4f} and R_{4g} ~~each~~ independently represents SO_2R_{4o} ~~(R_{4o} representing OH, a halogen atom, ONa, OK or OR_{4o1} (R_{4o1} representing a linear or branched alkyl group with 1 to 8 carbon atoms or a substituted or unsubstituted phenyl group))~~, a hydrogen atom, a halogen atom, an alkyl group with 1 - 20 carbon atoms, an alkoxy group with 1 - 20 carbon atoms, an OH group, an NH_2 group, an NO_2 group, $COOR_{4p}$ ~~(R_{4p} representing a H atom, a Na atom or a K atom)~~, an acetamide group, an OPh group, an NHPh group, a CF_3 group, a C_2F_5 group, or a C_3F_7 group (~~Ph indicating a phenyl group)~~, of which at least one is SO_2R_{4o}; n represents an integer selected from 0 to 4; m represents an integer selected from 0 - 8 in case n is 0, 2, 3 or 4, and m represents 0 in case n is 1; and ~~in case plural units are~~if more than one unit of the chemical formula (4A) is present, each of R_{4a}, R_{4b}, R_{4c}, R_{4d}, R_{4e}, R_{4f}, R_{4g}, R_{4o}, R_{4o1}, R_{4p}, m, and n ~~have the aforementioned meanings~~is independently selected for each unit,

where R_{4o} is OH, a halogen atom, ONa, OK, or OR_{4o1}

R_{4o1} is a linear or branched alkyl group with 1 to 8 carbon atoms or a substituted or unsubstituted phenyl group;

R_{4p} is H, Na, or K; and

Ph is a phenyl group;



(4B),

wherein each of R_{4h}, R_{4i}, R_{4j}, R_{4k}, R_{4l}, R_{4m} and R_{4n} ~~each~~ independently represents SO_2R_{4o} ~~(R_{4o} representing OH, a halogen atom, ONa, OK or OR_{4o1} (R_{4o1} representing a linear or branched alkyl group with 1 to 8 carbon atoms or a substituted or unsubstituted phenyl group))~~, a hydrogen atom, a halogen atom, an alkyl group with 1 - 20 carbon atoms, an alkoxy group with 1 - 20 carbon atoms, an OH group, an NH_2 group, an NO_2 group, $COOR_{4p}$ ~~(R_{4p} representing a H atom, a Na atom or a K atom)~~, an acetamide group, an OPh group, an NHPh group, a CF_3 group, a C_2F_5 group, or a C_3F_7 group (~~Ph indicating a phenyl group~~), of which at least one is SO_2R_{4o}; n represents an integer selected from 0 to 4; m represents an integer selected from 0 - 8 in case n is 0, 2, 3 or 4, and m represents 0 in case n is 1; and ~~in case plural units are~~if more than unit of the chemical formula (4B) is present, each of R_{4h}, R_{4i}, R_{4j}, R_{4k}, R_{4l}, R_{4m}, R_{4n}, R_{4o}, R_{4o1}, R_{4p}, m, and n ~~have the aforementioned meanings~~is independently selected for each unit,

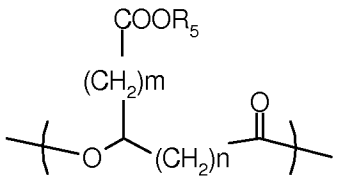
where R_{4o} is OH, a halogen atom, ONa, OK, or OR_{4o1};

R_{4o1} is a linear or branched alkyl group with 1 to 8 carbon atoms or a substituted or unsubstituted phenyl group;

R_{4p} is H, Na, or K; and

Ph is a phenyl group.

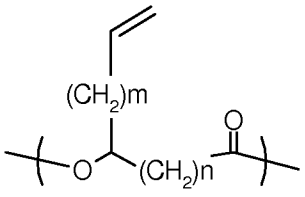
3. (Withdrawn) Polyhydroxyalkanoate comprised of at least a unit represented by a chemical formula (5) within the molecule:



(5)

wherein R_5 represents hydrogen, a group capable of forming a salt or R_{5a}; R_{5a} represents a linear or branched alkyl group with 1 - 12 carbon atoms, an aralkyl group or a substituent having a sugar; n represents an integer selected from 0, 2, 3, 4; m represents an integer selected from 2 - 8 in case n is 0, wherein R_5 represents R_{5a} only in case m is 2, and m represents an integer selected from 0 - 8 in case n is an integer selected from 2 - 4; and in case plural units are present, R_5, R_{5a}, m and n have the aforementioned meanings independently for each unit.

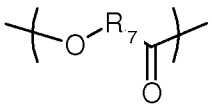
4. (Withdrawn) Polyhydroxyalkanoate comprised of at least a unit represented by a chemical formula (6) within the molecule:



(6)

wherein n represents an integer selected from 0, 2, 3, 4; m represents an integer selected from 2 - 8 in case n is 0, m represents an integer selected from 0 - 8 in case n is 2 or 3, and m represents an integer selected from 0 and 2 - 8 in case n is 4; and in case plural units are present, m and n have the aforementioned meanings independently for each unit.

5. (Currently Amended) ~~Polyhydroxyalkanoate~~ The polyhydroxyalkanoate according to any one of claims 1 to 4, further comprising a unit represented by a chemical formula (7) within the molecule:

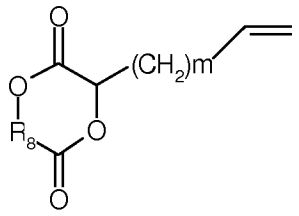


(7),

wherein R_7 represents a linear or branched alkylene with 1 - 11 carbon atoms, an alkyleneoxyalkylene group ~~(each~~, where each alkylene group ~~being~~ independently ~~with~~ has 1 - 2 carbon atoms~~)~~, a linear or branched alkenyl group with 1 - 11 carbon atoms, or an alkylidene group with 1 - 5 carbon atoms, which is unsubstituted or substituted with an aryl group; and ~~in case plural units are~~if more that one unit of the chemical formula (7) is present, R_7 ~~has the aforementioned meanings~~is independently selected for each unit.

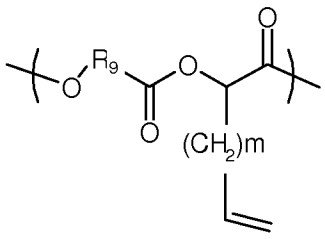
6. (Withdrawn) A method for producing polyhydroxyalkanoate

represented by a chemical formula (9), comprised of a step of polymerizing a compound represented by a chemical formula (8) in the presence of a catalyst:



(8)

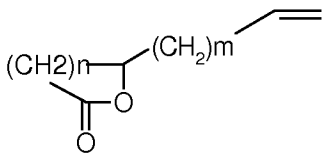
wherein R_8 represents a linear or branched alkylene with 1 - 11 carbon atoms, alkyleneoxyalkylene group (each alkylene group being independently with 1 - 2 carbon atoms), a linear or branched alkenyl group with 1 - 11 carbon atoms or an alkylidene group with 1 - 5 carbon atoms which is unsubstituted or substituted with an aryl group; and m represents an integer selected from 2 - 8;



(9)

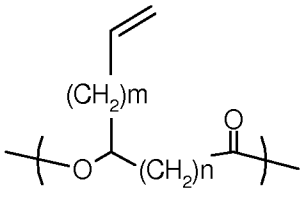
wherein R_9 represents a linear or branched alkylene or alkyleneoxyalkylene group with 1 - 11 carbon atoms (each alkylene group being independently with 1 - 2 carbon atoms), a linear or branched alkenyl group with 1 - 11 carbon atoms or an alkylidene group with 1 - 5 carbon atoms which is unsubstituted or substituted with an aryl group; m represents an integer selected from 2 - 8; and in case plural units are present, R_9 and m have the aforementioned meanings independently for each unit.

7. (Withdrawn) A method for producing polyhydroxyalkanoate represented by a chemical formula (13), comprised of a step of polymerizing a compound represented by a chemical formula (12) in the presence of a catalyst:



(12)

wherein n represents an integer selected from 2 to 4; m represents an integer selected from 0 - 8 in case n is 2 or 3, and m represents an integer selected from 0 and 2 - 8 in case n is 4:

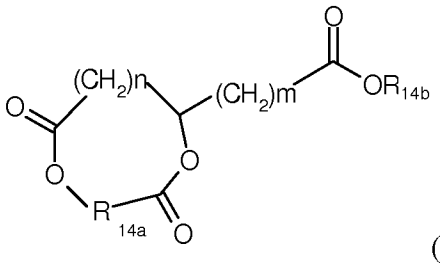


(13)

wherein n represents an integer selected from 2 to 4; m represents an integer selected from 0 - 8 in case n is 2 or 3, and m represents an integer selected from 0 and 2 - 8 in case n is 4, and in case plural units are present, m and n have the aforementioned meanings independently for each unit.

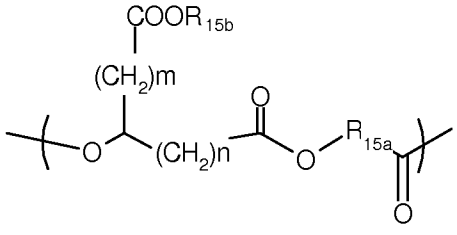
8. (Withdrawn) A method for producing polyhydroxyalkanoate represented by a chemical formula (15), comprised of a step of polymerizing a compound

represented by a chemical formula (14) in the presence of a catalyst:



(14)

wherein R_{14a} represents a linear or branched alkylene with 1 - 11 carbon atoms, alkyleneoxyalkylene group (each alkylene group being independently with 1 - 2 carbon atoms), a linear or branched alkenyl group with 1 - 11 carbon atoms or an alkylidene group with 1 - 5 carbon atoms which is unsubstituted or substituted with an aryl group; R_{14b} represents a linear or branched alkyl group with 1 - 12 carbon atoms or an aralkyl group; n represents an integer selected from 0, 2, 3 and 4; m represents an integer selected from 2 - 8 in case n is 0 and an integer selected from 0 - 8 in case n is selected from 2 - 4;

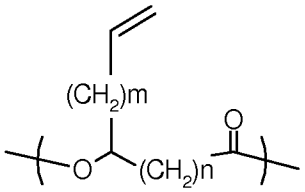


(15)

wherein R_{15a} represents a linear or branched alkylene with 1 - 11 carbon atoms, alkyleneoxyalkylene group (each alkylene group being independently with 1 - 2 carbon atoms), a linear or branched alkenyl group with 1 - 11 carbon atoms or an alkylidene group with 1 - 5 carbon atoms which is unsubstituted or substituted with an aryl

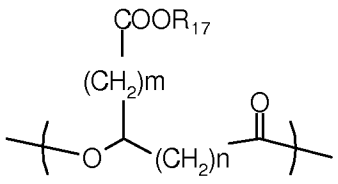
group; R_{15b} represents a linear or branched alkyl with 1 - 12 carbon atoms or an aralkyl group; n represents an integer selected from 0, 2, 3 and 4; m represents an integer selected from 2 - 8 in case n is 0 and an integer selected from 0 - 8 in case n is selected from 2 - 4; and in case plural units are present, R_{15a}, R_{15b}, m and n have the aforementioned meanings independently for each unit.

9. (Withdrawn) A method for producing a polyhydroxyalkanoate comprising a unit represented by a chemical formula (17), comprised of a step of oxidizing a double bond portion of a polyhydroxyalkanoate comprising a unit represented by a chemical formula (16):



(16)

wherein m represents an integer selected from 0 - 8; n represents 0, 2, 3 or 4; and, in case plural units are present, m and n have the aforementioned meanings independently for each unit:

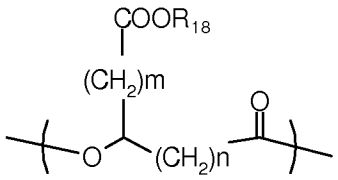


(17)

wherein m represents an integer selected from 0 - 8; R_{17} represents

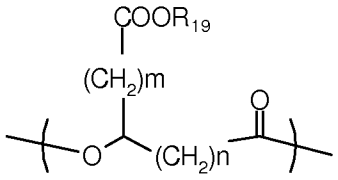
hydrogen, or a group capable of forming a salt; n represents 0, 2, 3 or 4; and, in case plural units are present, m, n and R_{17} have the aforementioned meanings independently for each unit.

10. (Withdrawn) A method for producing a polyhydroxyalkanoate comprising a unit represented by a chemical formula (19), comprised of a step of executing hydrolysis of a polyhydroxyalkanoate comprising a unit represented by a chemical formula (18) in the presence of an acid or an alkali, or a step of executing hydrogenolysis comprising a catalytic reduction of a polyhydroxyalkanoate comprising a unit represented by a chemical formula (18):



(18)

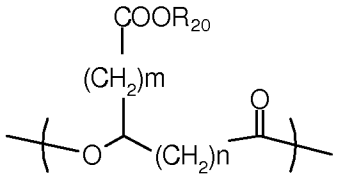
wherein R_{18} represents a linear or branched alkyl group with 1 - 12 carbon atoms or an aralkyl group; n represents an integer selected from 0, 2, 3 and 4; m represents an integer selected from 2 - 8 in case n is 0, or an integer selected from 0 - 8 in case n is 2, 3 or 4; and in case plural units are present, R_{18}, m and n have the aforementioned meanings independently for each unit;



(19)

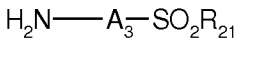
wherein R_{19} represents hydrogen, or a group capable of forming a salt; n represents an integer selected from 0, 2, 3 and 4; m represents an integer selected from 2 - 8 in case n is 0, or an integer selected from 0 - 8 in case n is 2, 3 or 4; and, in case plural units are present, R_{19}, m and n have the aforementioned meanings independently for each unit.

11. (Withdrawn) A method for producing a polyhydroxyalkanoate comprising a unit represented by a chemical formula (1), comprised of a step of executing a condensation reaction of a polyhydroxyalkanoate comprising a unit represented by a chemical formula (20) and an amine compound represented by a chemical formula (21):



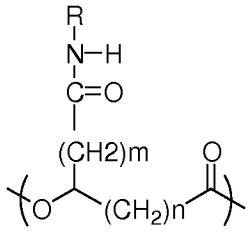
(20)

wherein R_{20} represents hydrogen, or a group capable of forming a salt; n represents an integer selected from 0 - 4; m represents an integer selected from 0 - 8 in case n is 0, 2, 3 or 4, or m is 0 in case n is 1; and, in case plural units are present, m and n and R_{20} have the aforementioned meanings independently for each unit;



(21)

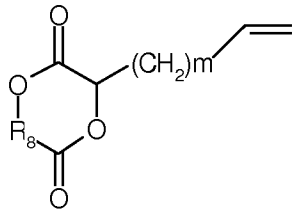
wherein R_{21} represents OH, a halogen atom, ONa, OK or OR_{21a}; R_{21a} and A_3 each independently is selected from a group having a substituted or unsubstituted aliphatic hydrocarbon structure, a substituted or unsubstituted aromatic ring structure, or a substituted or unsubstituted heterocyclic structure; and, in case plural units are present, R_{21}, R_{21a} and A_3 have the aforementioned meanings independently for each unit;



(1)

wherein R represents $-A_1-SO_2R_1$; R_1 represents OH, a halogen atom, ONa, OK or OR_{1a}; R_{1a} and A_1 each independently represents a group having a substituted or unsubstituted aliphatic hydrocarbon structure, a substituted or unsubstituted aromatic ring structure, or a substituted or unsubstituted heterocyclic structure; n represents an integer selected from 0 to 4; m represents an integer selected from 0 - 8 in case n is 0, 2, 3 or 4, and m represents 0 in case n is 1; and in case plural units are present, R, R_1, R_{1a}, A_1, m and n have the aforementioned meanings independently for each unit.

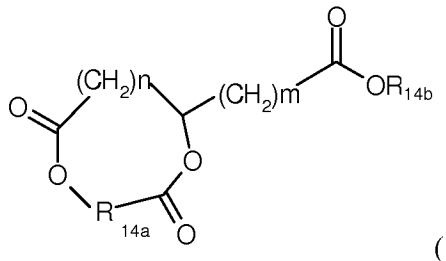
12. (Withdrawn) A compound represented by a chemical formula (8):



(8)

wherein R_8 represents a linear or branched alkylene 1 - 11 carbon atoms, or alkyleneoxyalkylene group with (each alkylene group being independently with 1 - 2 carbon atoms), a linear or branched alkenyl group with 1 - 11 carbon atoms or an alkylidene group with 1 - 5 carbon atoms which is unsubstituted or substituted with an aryl group; and m represents an integer selected from 2 - 8.

13. (Withdrawn) A compound represented by a chemical formula (14):



(14)

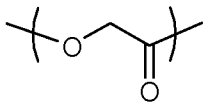
wherein R_{14a} represents a linear or branched alkylene with 1 - 11 carbon atoms, alkyleneoxyalkylene group (each alkylene group being independently with 1 - 2 carbon atoms), a linear or branched alkenyl group with 1 - 11 carbon atoms or an alkylidene group with 1 - 5 carbon atoms which is unsubstituted or substituted with an aryl group; R_{14b} represents a linear or branched alkyl group with 1 - 12 carbon atoms or an aralkyl group; n represents an integer selected from 0, 2, 3 and 4; m represents an integer

selected from 2 - 8 in case n is 0 and an integer selected from 0 - 8 in case n is selected from 2 - 4.

14. (Withdrawn) A method for producing a polyhydroxyalkanoate comprising a unit represented by a chemical formula (170), comprised of:

a step of reacting a polyhydroxyalkanoate comprising a unit represented by a chemical formula (168) with a base; and

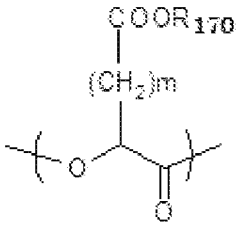
a step of reacting a compound obtained in the aforementioned step with a compound represented by a chemical formula (169):



(168)

(169)

wherein m represents an integer selected from 0 - 8; X represents a halogen atom; and R_{169} represents a linear or branched alkyl group with 1 - 12 carbon atoms or an aralkyl group:



(170)

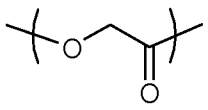
wherein m represents an integer selected from 0 - 8; R_{170} represents a linear

or branched alkyl group with 1 - 12 carbon atoms or an aralkyl group; and in case plural units are present, R_{170} and m have the aforementioned meanings independently for each unit.

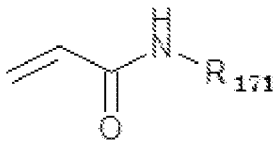
15. (Withdrawn) A method for producing a polyhydroxyalkanoate comprising a unit represented by a chemical formula (172), comprised of:

a step of reacting a polyhydroxyalkanoate comprising a unit represented by a chemical formula (168) with a base; and

a step of reacting a compound obtained in the aforementioned step with a compound represented by a chemical formula (171):



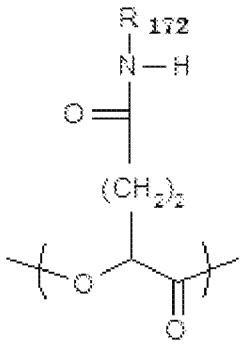
(168)



(171)

wherein R_{171} represents $-A_{171}-SO_2R_{171a}$; R_{171a} represents OH, a halogen atom, ONa, OK or OR_{171b}; R_{171b} and A_{171} each independently is selected from a group having a substituted or unsubstituted aliphatic hydrocarbon structure, a substituted or unsubstituted aromatic ring structure, or a substituted or unsubstituted heterocyclic structure; and in case plural units are present, R_{171}, R_{171a}, R_{171b}, and A_{171} have the

aforementioned meanings independently for each unit;



(172)

wherein R_{172} represents $-A_{172}-SO_2R_{172a}$; R_{172a} represents OH, a halogen atom, ONa, OK or OR_{172b}; R_{172b} and A_{172} each independently represents a group having a substituted or unsubstituted aliphatic hydrocarbon structure, a substituted or unsubstituted aromatic ring structure, or a substituted or unsubstituted heterocyclic structure; and in case plural units are present, R_{172}, R_{172a}, R_{172b}, and A_{172} have the aforementioned meanings independently for each unit.